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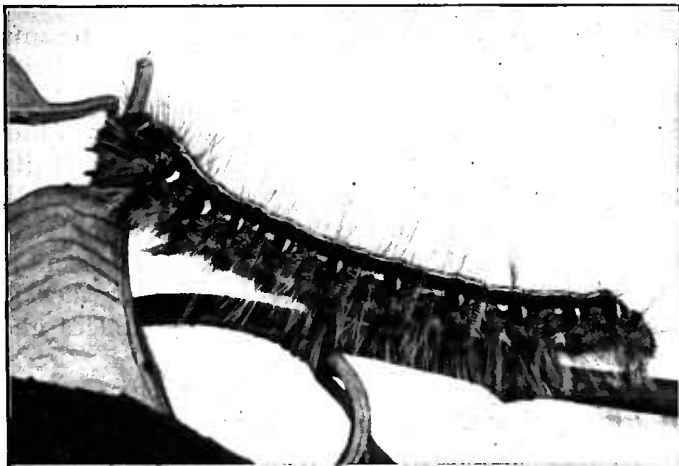
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THE APPLE-TREE TENT CATERPILLAR

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Contribution from the Bureau of Entomology
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THE APPLE-TREE TENT CATERPILLAR makes the unsightly nests or tents to be seen in the spring in trees along roadways, fences, and streams, and in orchards. It varies greatly in abundance from year to year or over longer periods. Wild cherry is the favorite food plant, but many other plants are attacked, including several orchard fruits, especially the apple. During years when caterpillars are abundant the trees may be so completely stripped of their foliage that larvæ are forced to hunt other food plants and hence are to be seen in numbers crawling over the ground and fences and elsewhere.

There is only one brood of larvæ each year and after the spring visitation no further annoyance will be experienced during the season. Ordinarily the many natural enemies of the tent caterpillar hold it well in check, but when these agencies are inactive the insect may become very abundant.

Well-sprayed orchards suffer little from tent-caterpillar injury. On roadside and waste trees the nests may be destroyed by hand or with rags saturated with kerosene and fastened on the end of a pole. Direct benefit will follow searching out and destroying the egg masses on twigs of trees. The organization of school children and community citizens' associations for this work has had most excellent results in many localities.

THE APPLE-TREE TENT CATERPILLAR.¹

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THE TENTS, conspicuous, unsightly nests (fig. 1), of the apple-tree tent caterpillar are familiar objects in the spring in trees along roadways, streams, and fences, in neglected orchards, and elsewhere.

The gregarious caterpillars construct the tents for their protection, and these, at first small, are gradually enlarged as the larvæ grow, often to a foot or more in height and diameter, the size varying with the number of individuals in the colony. The caterpillars feed upon the foliage of the trees, stripping the leaves from the limbs adjacent to the nest, and if there be several colonies in a tree, as is frequently the case during periods of abundance, the foliage may be quite destroyed, leaving the branches as bare as in midwinter (fig. 2).

DISTRIBUTION AND FOOD PLANTS.

The tent caterpillar is a native American species occurring very generally in the United States from Canada south to Florida and westward about to the Rocky Mountains. From the Rockies to the Sierras the species is replaced by another of the same genus,² which ranges from Canada to Mexico, and this latter form in the Pacific Northwest is replaced by still another species.³

The tent caterpillar has been a troublesome pest from the earliest times. Its injuries in Massachusetts in the years 1646 and 1649 led the early settlers to term these "caterpillar years." At rather long and irregular intervals the caterpillars have been excessively abundant in different parts of their range, but more particularly in the New England States. This species was among the first to receive

¹ *Malacosoma americana* Fab.; order Lepidoptera, family Liparidae.

² *Malacosoma fragilis* Stretch.

³ *Malacosoma pluvialis* Dyar.

attention by the early American entomologists, and the principal features in its life and habits have been known for many years.

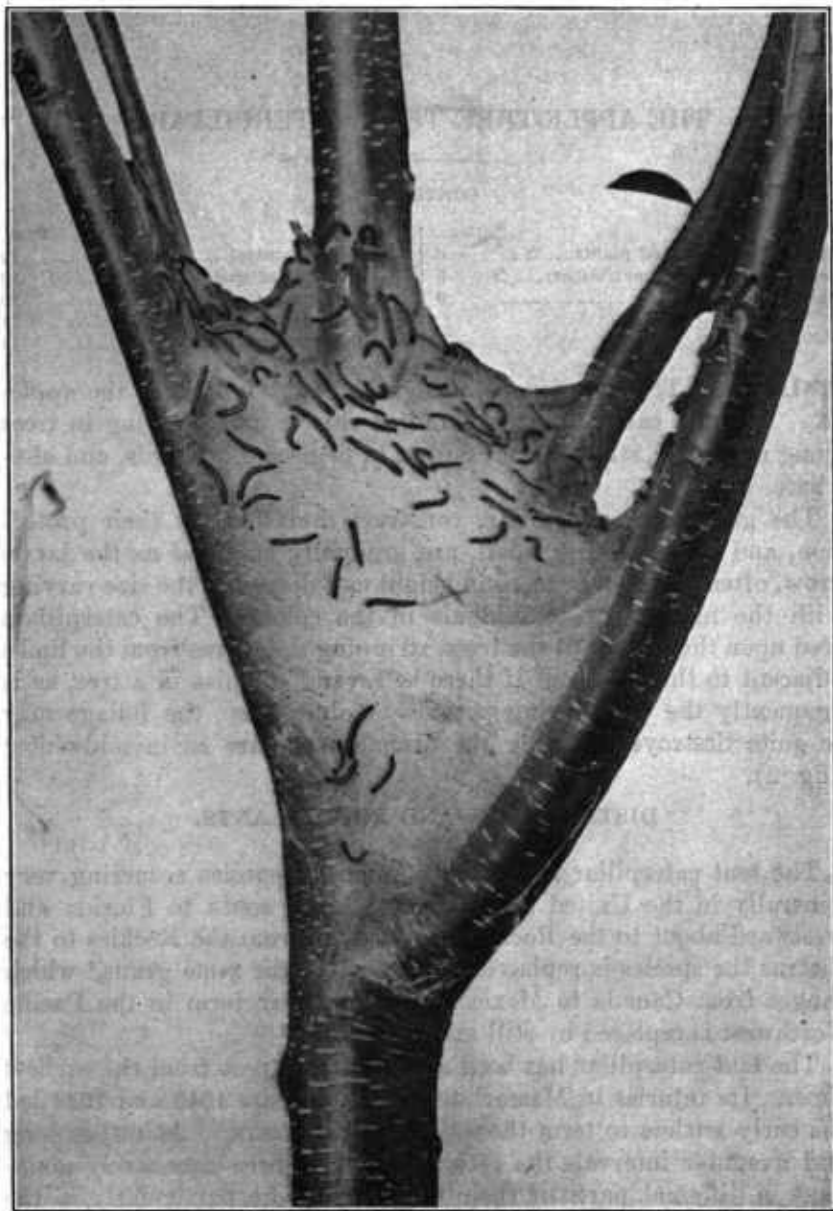


FIG. 1.—Nest and larvæ of apple-tree tent caterpillar in crotch of wild cherry tree.

Throughout its extended distribution the insect is likely to be abundant each year in one or more localities and often over a consider-

able territory. Scattered nests are to be found usually during any spring, although in some seasons these are little in evidence.

The favorite food of the tent caterpillar is the wild cherry, and this is probably its native food plant. Next to the wild cherry the apple is apparently preferred. In the absence of its favorite food, or under special conditions, it attacks many other plants, as plum, peach, thorn, pear, rose, and other members of this group, as also beech, witch-hazel, elm, maple, and various species of willows, oaks, and poplars. During periods of unusual abundance trees are more

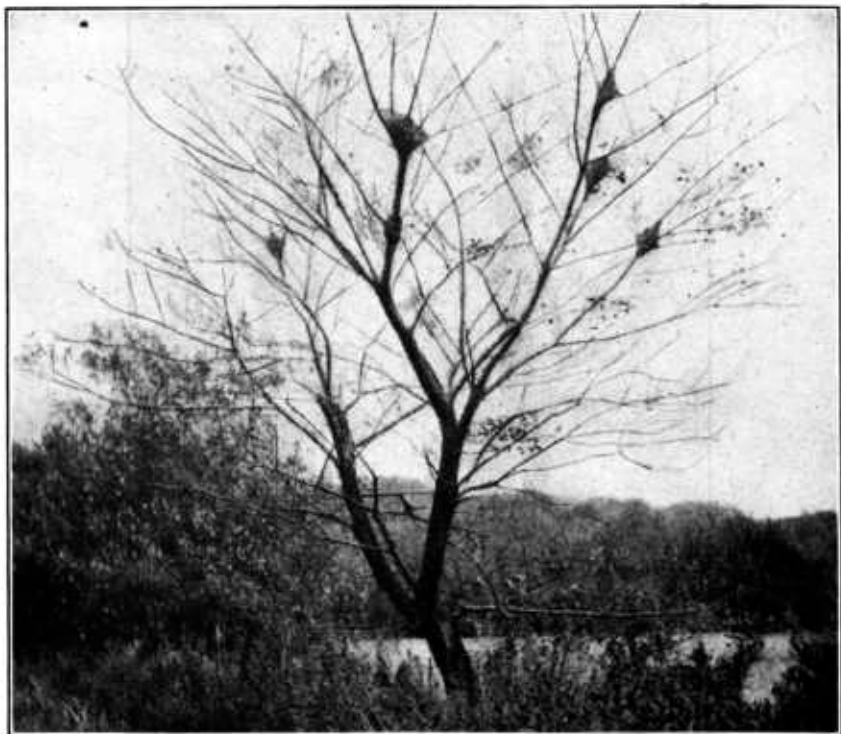


FIG. 2.—Nests of apple-tree tent caterpillar in wild cherry tree which the larvæ have defoliated.

or less completely defoliated, and at a time when they most need the leaves for their growth or for the development of the fruit, and they are materially weakened, though rarely killed.

DESCRIPTION AND SEASONAL HISTORY.

THE EGG.

Eggs are deposited in masses or belts encircling the smaller twigs, as shown in figure 3. Different egg masses may be from one-half to three-fourths of an inch in length and contain from 150 to 250

eggs. The average number of eggs in several egg masses counted on peach and apple was about 223 each. Each egg belt is deposited by an individual female and ordinarily represents the entire number which she will deposit. Eggs are placed on end, cemented closely together, the whole oval-shaped mass being finally covered with a layer of light-brown frothy glue, which soon becomes tough, brittle, and glistening.

Eggs are deposited by the moths by early summer, or earlier in the South, the embryonic larvæ developing so that by fall they are

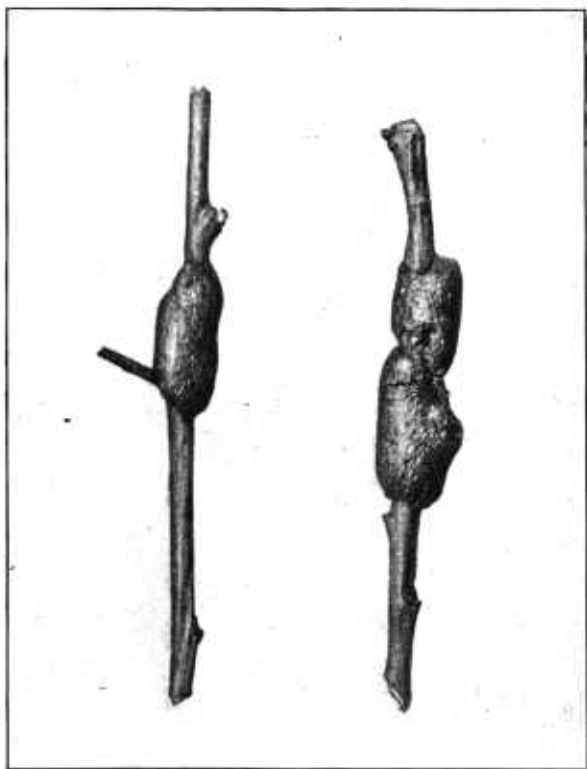


FIG. 3.—Egg masses of apple-tree tent caterpillar. Slightly enlarged.

practically of the size when hatched, although remaining within the egg until the following spring. With the coming of a warm spell the larvæ escape by gnawing through their eggshells, often before there is foliage out for food, and under these circumstances they may feed upon the glutinous covering of the egg mass.

THE LARVA.

In the presence of food the larvæ begin the formation of their nest in about two days from hatching, usually selecting the crotch

formed by two limbs and ordinarily one that is not far from the egg mass. The caterpillars are sociable, those from one egg mass inhabiting one nest and feeding together upon the adjacent leaves. If two egg masses happen to be deposited close together, as on the same or adjacent twigs, the resulting caterpillars may unite in one nest. Wherever they go each larva spins a thread of silk, the young individuals hanging suspended from a silken thread when they drop, as do the cankerworms and many other larvæ. The nests, at first small and affording but little shelter, are gradually enlarged as the caterpillars grow and soon furnish ample protection. Upon close examination the nests of this species will be found to be made up of layers of silk, with room for the larvæ between the layers. These layers are said to be the result of the caterpillars' habit of lying on the outside of the nest during serene weather, the few restless individuals crawling back and forth over the resting mass, spinning silk as they go, soon forming a new layer. During rainy and cloudy weather the larvæ remain mostly within the nest, but when the weather is favorable they feed at regular intervals; according to an early American entomologist, in the morning, in the afternoon, and again during the night. Upon becoming nearly full grown the larvæ wander singly away from the nest, feeding upon such plants as come to hand. This wandering habit preparatory to pupation results in the scattering of the pupæ and greatly increases the chances of their escape from destruction from their numerous natural enemies.

In about six weeks from hatching—when full grown—the caterpillars are about 2 inches long, cylindrical, deep black, with a white stripe along the back, and lateral markings, as shown on title page. On each side is a row of oval pale-blue spots, one on the middle of each segment, and on the anterior side of each is a broader, deep velvety black spot. The body is sparsely clothed with fine, soft, yellowish hairs of varying length, thickest perhaps toward the anterior end, where they project forward over the black-colored head.

THE COCOON.

The larvæ select for pupation any convenient, more or less secluded place, as under loose bark, in grass or brush under trees, along fences, etc. If close to outbuildings the larvæ often make their cocoons in the angles along the sides, in window casings, etc. The cocoon, shown in figure 4, at the left, is oval in shape, about 1 inch long, and composed exteriorly of coarse, loose, whitish threads of silk surrounding the tougher parchmentlike lining. The silk of the cocoon is intermixed with a yellow powdery substance, which readily comes off when disturbed. Cocoons are made more or less singly, although in suitable shelter near the nest several may be found spun

together, the larvæ taking advantage of the same protection. Cocoons are frequently found within the nest, although these will usually prove to be parasitized.

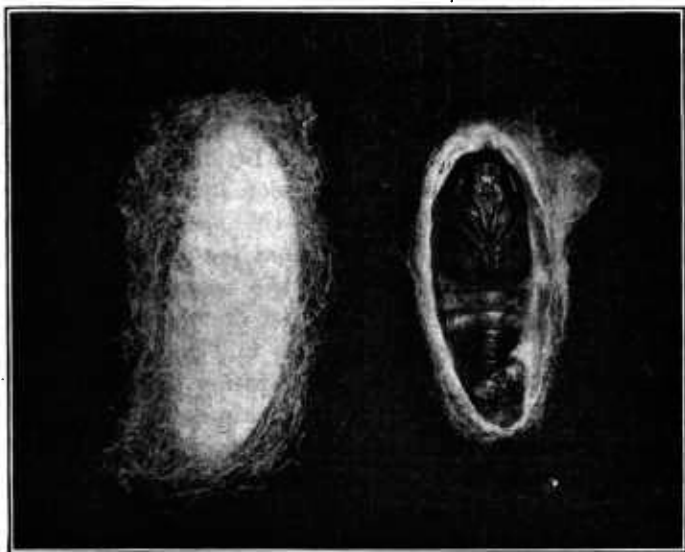


FIG. 4.—Cocoon and pupa of apple-tree tent caterpillar. About twice natural size.

THE PUPA.

Within the cocoon the larva changes to a short, oval, brownish pupa, as shown in figure 4, at the right. This stage lasts about three weeks, the time varying somewhat; then the moth appears.

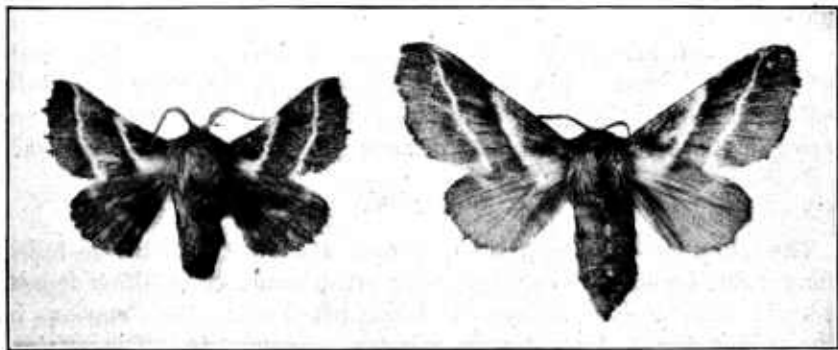


FIG. 5.—Moths of apple-tree tent caterpillar; male at the left. Slightly enlarged.

THE ADULT.

Both sexes of the tent-caterpillar moth are shown in figure 5, the female to the right. These are dull reddish-brown, stout-bodied

moths, with a wing expanse in the females of about 1.5 to 2 inches, and in the males of from 1.2 to 1.3 inches. Obliquely across the forewings of each sex are two nearly parallel whitish lines, as shown in the illustration. Soon after emergence the sexes mate, and eggs are deposited on limbs and twigs. There is only one generation each year, the insects existing in the egg stage throughout the remaining summer and fall and through the winter, the young larvæ coming from the eggs in early spring and forming their nests, or tents, as stated.

NATURAL ENEMIES.

This species is subject to attack by numerous parasitic and predacious enemies, which undoubtedly exert an important influence in repression. Very minute, four-winged flies of the order Hymenoptera deposit their eggs within those of the tent-caterpillar moth, the resulting larvæ or grubs finding sufficient food for their growth and development to parent flies. Three egg parasites have been recorded for this species.¹

Larvæ and pupæ furnish food for a large number of parasites (fig. 6) and hyperparasites. Thus some 24 species of insects which directly or indirectly feed upon the tent caterpillar have been recorded.² Sixteen primary parasites have been recorded from the larva and pupa.³

Among predacious insects are several species of ground-beetles which are said to feed upon the larvæ, among them *Calosoma scrutator* Fab. Among the Hemiptera several species of *Podisus*⁴ and the reduviid *Diplodus luridus* Stål have been observed attacking the larvæ. *Podisus spinosus* Dall. and *Perillus claudus* Say also are stated to be enemies of the caterpillar.

While most birds, as a rule, do not feed on hairy larvæ such as the tent caterpillar, several species are known to include this insect in their diet, as the black-billed and yellow-billed cuckoos, the blue jay, crow, chickadee, Baltimore oriole, red-eyed vireo, chipping sparrow, and yellow warbler. The common toad feeds greedily on tent caterpillars, the remains of from 15 to 20, and in one instance 37 of these larvæ, having been found in their stomachs.

¹ *Telenomus clistocampæ* Riley, *Pteromalus* sp., and *Platygaster* sp.

² Flske, William F. A study of the parasites of the American tent caterpillar. N. H. Coll. Agr. Exp. Sta. Tech. Bul. 6, p. 2. 1903.

³ *Itoplectis conquistator* (Say), *Pimplidea annulipes* (Brullé), *Pimplidea pedalis* (Cresson), *Isoropus inquistortellus* (Dalla Torre), (*Amelocotonus*) *Hyposoter fugitivum* (Say), (*Amelocotonus*) *Hyposoter clistocampæ* (Weed), *Anomalon exile* Provancher, *Anomalon anale* (Say), *Spilocryptus extrematis* (Cresson), *Apanteles congregatus* var. *rufocoxalis* (probably a misdetermination, as *rufocoxalis* Riley is normally a parasite of cutworms), *Apanteles clistocampæ* Ashmead, *Rhogas intermedius* Cresson. (*Bracon*) *Habrobracon gelechiæ* (Ashmead) (probably a misdetermination, and undoubtedly *Habrobracon hopkinsi* Viereck), *Diglochs omnivora* (Walker), *Mitotropis clistocampæ* Ashmead—all four-winged wasplike parasites—and the tachina fly *Frontina frenchii* Williston.

⁴ *Podisus placidus* Uhler, *P. modestus* (Dallas), and *P. serieventris* Uhler.

The caterpillars are also subject to destruction by a wilt disease, especially when they become grown or nearly so, and sick, sluggish individuals may often be observed lying outside at full length on the nest. Larvæ killed by this disease are soft-bodied, the skin easily rupturing and permitting the escape of the liquid decomposed body contents.

METHODS OF CONTROL.

REMOVAL OF USELESS TREES.

As has been stated, the unsightly nests of the tent caterpillars are especially apt to be found on wild cherry, apple, and other trees growing along roadsides, fences, and elsewhere. In most cases such trees could doubtless be removed without disadvantage, and their removal would greatly reduce the numbers of this pest by lessening their favorite food supply.

COLLECTING THE EGGS.

During the dormant period of trees, when the leaves are off, the egg masses are fairly conspicuous, and with a little practice may be readily found; it is then that the twigs bearing them should be cut off and burned. Trees infested with larvæ during the early part of the year, or those in the immediate vicinity, are perhaps more likely to be chosen by the parent moth for the deposition of her eggs, and such trees at least should be searched if it

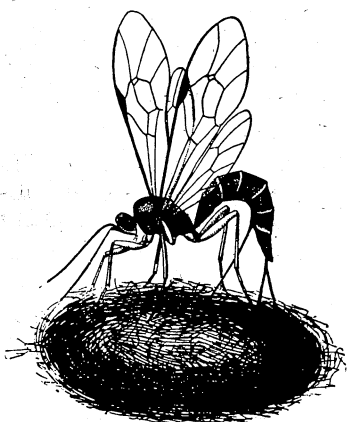


FIG. 6.—*Itoplectis* in the act of ovipositing on cocoon of apple-tree tent caterpillar. Enlarged. (Fiske.)

is not practicable to extend the work to the orchard as a whole. This work may be combined with pruning to good advantage, and a look-out should be kept not only for the eggs of this insect but for the eggs and cocoons of other injurious species which pass the winter on the trees.

Practical illustrations of what may be accomplished in collecting the egg masses of this species were reported from Michigan. The tent caterpillar was present in unusual numbers in the northwestern part of that State during the season of 1913, and egg masses were consequently very much in evidence the following winter (1913-14). Through circulars issued to the rural schools, the school children were interested in the collection of egg masses, with surprisingly successful results. A special "apple-tree tent-caterpillar week" was designated and other means adopted to carry out effectively the campaign against this insect. The total number of egg masses collected

through the work of the school children was variously estimated at from one million to several million.

Since each egg mass contains on the average some 250 eggs, the advantages of this work may be readily calculated.

There are great possibilities for the accomplishment of much effective work in the control of this and other insect pests by the enlistment of the services of children in rural schools, and the work is a practical application of science for the benefit of agriculture.

DESTROYING THE CATERPILLARS.

Neglect to search out the egg masses during the winter will result in the appearance of the larvæ about the time the trees are putting forth foliage. The nests, at first small, are soon so increased in size as to attract attention. If the caterpillars are destroyed as soon as the small nests are detected, this will prevent further defoliation of the trees, and the rule should be adopted to destroy them promptly as soon as discovered. In this work different practices may be adopted, as destruction by hand, or by the use of rags saturated with kerosene and fastened to a pole.

When in convenient reach, the nests may be torn out with a brush, with gloved hand, or otherwise, and the larvæ crushed on the ground, care being taken to destroy any caterpillars which may have remained on the tree.

The use of a torch to burn out the nests will often be found convenient, especially when these occur in the higher parts of waste trees. An asbestos-torch, such as is advertised by seedsmen, will be satisfactory, or one may be made simply by tying rags to the end of a pole. The asbestos or rags are saturated with kerosene and lighted and the caterpillars as far as possible cremated. Some caterpillars, however, are likely to escape, falling from the nest upon the application of the torch. In using the torch great care is necessary that no important injury be done valuable trees; it should not be used in burning out nests except in the smaller branches and twigs, the killing of which would be of no special importance. Nests in the larger limbs should be destroyed by hand, as the use of the torch may kill the bark, resulting in permanent injury. Entirely satisfactory results have been reported in the employment of rags saturated with kerosene and fastened to the end of a pole, to be used not as a torch but to wet the caterpillars in the tree with the oil.

SPRAYING WITH ARSENICALS.

Tent caterpillars are readily destroyed by arsenicals sprayed on foliage of trees infested by them. The caterpillars are very sensitive and are killed in from two to three days by the use of Paris green at the rate of 1 pound to 300 or 400 gallons of water.

Orchards or trees sprayed with arsenicals in the spring for the codling moth, cankerworms, or similar insects will be kept practically free from tent caterpillars, and this species rarely requires attention at the hands of the up-to-date commercial fruit grower. It will be troublesome in the scattered trees around the home or in the small orchard which is not regularly sprayed. On such trees the nests will likely be in evidence every spring, and during occasional years the caterpillars may be excessively abundant, completely defoliating the trees.

Even in the small home orchard of a dozen or more trees it will be found highly profitable to adopt a system of spraying which will control not only tent caterpillars but such serious pests as the codling moth, cankerworms, and various bud and leaf breeding insects, and will greatly reduce injury from the curculio.

Any of the arsenical insecticides may be used, as Paris green, arsenate of lime, arsenate of lead, etc. The first is used at the rate of 1 pound to 150 or 200 gallons of water, and the last two at the rate of 2 pounds of the paste form, or one-half the quantity of the powdered form, to 50 gallons of water, the milk of lime obtained by slaking 2 or 3 pounds of stone lime being added to neutralize any caustic effect of the arsenical on the foliage. Preferably, however, the arsenate of lead and arsenate of lime should be used in dilute lime-sulphur wash or Bordeaux mixture, thus effecting a combination treatment for insects and fungous diseases. On stone fruits, such as cherry, peach, and plum, arsenicals are likely to cause injury to foliage and must be used with caution. On such trees the arsenate of lead is preferable to the arsenicals, as it is less injurious to foliage, and on all trees sticks much better. In spraying for the tent caterpillar only, applications should be made while the caterpillars are yet small, as these succumb more quickly to poisons than those more nearly full grown, and prompt treatment stops further defoliation of the trees.

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